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ABSTRACT

Using a test-observe-test design with a sample of 29 4-year-old children, this study examined the relationship between children's activity choices in a typical progressive nursery school and their intellectual performance, socioeconomic status (SES), and sex. An attempt was made to identify those experiential factors associated with changes in intellectual performance over a period of 4 months. All subjects were pretested on a wide range of intellectual measures including the Wechsler Pre-school and Primary Scale of Intelligence (WPPSI), the English Picture Vocabulary Test (EPVT), and the Linear and Circular Order, Seriation, and Multiple Classification tests. Using the Child Observation Schedule (COS), observers recorded subjects' activities, interactions, and behaviors for 4 mornings each week over a period of 4 months. The posttests were then administered to all subjects. Results indicated that (1) for all subjects taken as a group, the mean improvements were significant and relatively uniform across all the intelligence measures used; (2) high IQ children spent more time listening to stories, spent more time in verbal interaction with others, and were more receptive to adult-initiated communication; (3) low SES children spent more time alone, more time on social/ personal activity, more passive time with adults and more time in solitary play than children from higher SES; and (4) girls spent less time on physical activities and more time on social activities than boys. (Author/MP)

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COGNITIVE SOCIALISATION OF 4-YEAR OLD CHILDREN IN NURSERY SCHOOL

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INTRODUCTION

The reporting by McGarrigle and Donaldson (1974) of the 'naughty teddy' phenomenon has revitalised the efforts of developmental psychologists to investigate the social factors relating to the cognitive development of children. In many ways the underlying assumptions behind this trend to extend socialisation theory in relation to child development can be traced back to the early work of Hess and Shipman (1968) in cognitive socialisation, one of the outcomes of which was to focus attention on the role of mothers as 'teachers'.

Since then, several studies have been reported showing that children's intellectual activity can be enhanced by helping mothers to take a more active part in the early education of children. (Donachy, 1976; Wilkinson and Murphy, 1976). However, knowledge is limited in the relationship between the features of a young child's every day social experiences and the emergence of enhanced intellectual powers.

Observational techniques are now available to permit more naturalistic study of the accumulative effects of day-to-day social encounters with adults and children on intellectual performance, though several studies carried out to date have concentrated on the limiting factors on the growth of cognition. Wachs (1971) studied the intensity of stimulation at home and related this to performance in Piagetian tasks for a group

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of infants up to 2 years. He showed that an excessive variety of circumstances was negatively associated with cognitive growth. Also in the home context, Tizard (1979) found that mothers in different social groups react very differently to the questions asked of them by their children. So called "middle-class" mothers were more supportive of children in their quest to more understanding about the world.

In an institutional context, Tizard et al. (1976b) also using observational methods, found that a free-play setting was not necessarily conducive to growth of attention. Kniveton and Pike (1972) reported that in a group of five year olds, social class, intelligence and time in play had no effect of the type of play engaged in. However, Bruner (1980) identified certain activities (structured construction, art and music, school readiness tasks) which were most likely to produce high elaboration and concentration in play.

The nature and extent of involvement of adults in pre-school centres has been the subject of several investigations (e.g. Sylva et al, 1980) though little is known of the impact of adult/child interaction on the growth of intellectual capabilities. In a recent study by Cooper (1979), it was reported that the interactive effect of the adult can effect the degree and nature of the verbalisation of young children. The role of the adult in promoting both quantity and quality of verbal expression was clearly demonstrated.

The present study is aimed at a more extensive analysis of children's behaviour patterns in nursery school and relates a variety of social interactional indices gathered over a four month intense observational period to relative levels of intellectual performance, socio-economic status and sex. From this analysis an attempt was made to identify those experiential factors associated with changes in intellectual performance over the duration of the study. In addition, attention was focussed on those children who appeared to benefit significantly from nursery school and those children whose intellectual performance did not improve.

DESCRIPTION OF THE ENQUIRY (This entire section suitable for smaller print)

1. Location - area and school

The study was carried out in an urban area of Renfrewshire which was one of the 45 'areas for priority treatment' selected by Strathclyde Regional Council (1976).

The school was a modern purpose-built nursery school to accommodate 140 children in three groups; mornings only, afternoons only and a small all-day group. The all-female staff consisted of a head teacher, 2 assistant teachers and 6 nursery nurses. The children were distributed between the 2 halves of the school (each section being under the control of an assistant teacher) and given considerable freedom to choose how and where they spent their time in the play areas. Play facilities of the school were similar in both halves with the staff distributing their time

and expertise at the various 'stations'.

These stations were identified prior to the investigation and categorised as listed below. Most stations had a fixed location (e.g. climbing frame); others were rotated in location but not content (e.g. book corners) and a third group was less predictable in terms of appearance and placement (e.g. story sessions, displays).

2. Classification of Stations

(a) Cognitive

(i)	Verbal/Symbolic:	Stories, Book corners, Displays.
(ii)	Construction/Fine Motor:	Construction Games, Small Blocks, Woodwork.
(iii)	Concrete Reasoning/Problem Solving:	Puzzles, Table Games, Magnet Table.
(iv)	Expressive/Artistic:	Clay and Plasticine, Paints (Easel and Table), Music, Cut and Paste.
(v)	Imaginative:	Playhouse, Dressing-up, Water, Sand (Wet and Dry), Doll's house, Small toys.

(b) Physical (Located both indoors and outdoors)

Large Boxes, Large Blocks, Climbing Frame, Hill, See-saws, Chutes, Large Push Toys, Tyres, Paved Area, Veranda, Tree, Trampoline.

(c) Personal/Social

Baking, Play Dough, Cloakroom, Toilets, Sinks, Cafe, Kitchen, Walk-in Cupboard.

(d) Unclassified

This category applied when a child could not be classified as being at any station, (e.g. wandering aimlessly). Only limited use of it was required due to the purposeful nature of most child and staff behaviour.

3. The Sample

(a) Children

29 children in their immediate pre-school year were selected for the study. Ages ranged between 45 - 57 months at time of pre-testing (mean age = 50.8 months). This sample of children, from the 140 attending nursery school was selected according to the following criteria:

(i) Attendance - mornings only.

(ii) Socio-economic status - either I/II or IV/V according to the Registrar General's classification of fathers' occupations.

(iii) Subjects to be native English-speaking.

(iv) Subjects to be free from both physical and mental handicap.

There were 18 males and 11 females in the sample; 14 children were from S.E.S. I/II and 15 from S.E.S. IV/V; 16 children attended one nursery side and 13 attended the other. Whilst this nursery school was in an A.P.T., it was clear from the socio-economic and psychometric data that the most severely deprived children were to a large extent not attending nursery school. This in itself suggests that alternative strategies will need to be found to provide the most disadvantaged

children with such benefits as are to be found in a cognitively-oriented pre-school.

(b) Adults

Those adults present on a regular basis included the head teacher, her two assistant teachers and the six nursery nurses. The three teachers were experienced in primary education and had taken an extra nursery qualification. The nursery nurses all held the N.N.E.B. Diploma. Furthermore, all the staff had worked together for a session prior to the study and conditions of staff experience and stability were therefore decidedly high. The head teacher was not included in the observation rota as her role was more diffuse than the other staff members. Student nurses, parents and other visitors were also excluded except when they interacted with a child under scrutiny.

4. Design

A test-observe-test design was used. Although the investigation was limited to one educational unit, it was hoped to compensate for this by providing extensive qualitative and quantitative data on this school. Accordingly, all subjects were pre-tested on a wide range of intellectual measures (general intelligence, language, operativity). The Child Observation Schedule (C.O.S.) which had been piloted prior to the study and employed for two months with 10 children attending another nursery school was used with the sample of 29 children over a period of 4 months for 4 mornings each week. The post-tests were

then completed. The Staff Observation Schedule (S.O.S.) which was adapted from the work of Tizard et al (1976a) was similarly used.

5. Instrumentation

(a) Cognitive Measures

The following tests were administered in the nursery school by a team of educational psychologists experienced in testing pre-school children: Wechsler Pre-school and Primary Scale of Intelligence (Wechsler 1967), Reynell Development Language Scales (Reynell, 1969), English Picture Vocabulary Test (Brimer and Dunn, 1962), Linear and Circular Order (Lunzer 1970), Seriation (Lunzer, 1970) and Multiple Classification (Lunzer, 1970).

(b) Child Observation Schedule

This allowed the written recording of basic data such as where the child was in school, what was he doing, what degree of movement was there, whom was he with, what kind of communication was taking place and in which direction and how often did he change his activities. From this data scores on ten dimensions were obtained, namely:-

(i) Station - categorised as described previously.

(ii) Level of Social Participation in Play - this was an adaptation of Parten's (1932) categories. Behaviour determined as play was assessed as Solitary, Parallel, Associative or Cooperative.

(iii) Participants - figures were noted from the frequency each subject was alone, with one or more children or with an adult.

(iv) Indoors/Outdoors - time spent in both situations was noted and related to other studies and measures.

(v) Non-Play Activities: - these and the next were based on the work of Tizard et al (1976b). There were 10 sub-categories namely,

(a) Goal directed activity for physical needs, e.g. eating, dressing, toileting.

(b) Other goal-directed activity, not supervised by an adult, where the main interest was in achieving the goal, not in the process of achieving it.

(c) Goal directed activity with an adult to produce an acceptable end product.

(d) Physical attacks or threats (not rough and tumble play).

(e) Verbal quarrels and taunts.

(f) Crying, screaming and whining.

(g) Talking, except about play.

(h) Observing events and listening to conversation.

(i) Listening to stories, music.

(j) Apparently un-occupied.

(vi) Play Categories

All other behaviour not included above was categorised according to use of materials, namely, play with no materials, partial use of materials (e.g. scattering sand), appropriate play (e.g. building a sand castle) and symbolic play (e.g. scattering sand and calling it rain falling).

(vii) Mobility Categories - following the work of McGrew (1972), gross or locomotive patterns were given a threefold classification namely (1) Static Behaviour - no distinct lateral or forward motion (e.g. sit, stand): (2) Mobility - distinct lateral or forward motion (e.g. walk, crawl) and (3) Fast Mobility - the previous criteria plus a high level of energy (e.g. run, chase). The rational for this measure was that the child's degree of movement was possibly of significance for cognitive development in the nursery school where a prima facie case could be made for sedentary, relatively immobile behaviour being best suited to lengthy verbal interaction sequences.

(viii) Communication - principal concern was with verbal communication but some agonistic and social forms of communication were recorded using the categories of Smith and Connolly (1972).

(ix) Direction of Communication - each instance of communication was rated as to its source and direction (Subject to Child, Child to Subject; Subject to Adult, Adult to Subject).

(x) Flitting - this measure was the frequency change of station per observation session. This applied only when a child moved from one category of station to another, e.g. from the Book Corner (Verbal/Symbolic) to the Large Boxes (Physical). A movement within a category (e.g. Physical Stations) such as changing from the climbing frame to a chute would not be coded as a change of station. This aspect of behaviour has previously been described by Kniveton & Pike (1972) and more recently Bruner (1977) has suggested that 'cruisers' may miss out on nursery experiences.

(c) Staff Observation Schedule

Using categories developed by Tizard et al (1976a), observations were made of the staff on similar lines to those of the children. The analysis of these data is reported in a separate paper (Murphy, 1980).

6. Methods of Observation

All subjects (children and staff) were observed in a randomly selected order during the four month observation period (9.30 a.m. - 11.30 a.m. daily Mondays to Thursdays) by one of the authors (F.M.). Each subject had a substitute who would be observed in the case of absence of the original choice. Sessions lasted five minutes (four minutes observation, one minute for orientation of observer). The observer, standing close to each child, coded the child's behaviour on the schedule for each half-minute segment of the four minutes' observation. The pattern was five seconds observation, 20 seconds coding, and 5 seconds to relocate the child before the next observation segment. The mean

number of child observation sessions was 34.6, with a standard deviation of 4.5.

The frequencies for each category for each subject were transferred to a grid using the procedure advocated in Hutt and Hutt (1970). The frequencies were then summed within behaviour categories and expressed as a fraction of the total number of observations for each subject. i.e. % time in Activity A =

$$\frac{\text{Number of samples scoring A}}{\text{total number of samples}} \times 100$$

7. Inter-Observer Reliability

This was checked by the use of two videotapes of events in the nursery setting. These were then categorised and coded simultaneously by the observer and two other observers. Results compared favourably with the reliability data from comparable studies (Smith, 1970; Kniveton & Pike 1972; Lytton, 1973). Concordance between the observer (F.M.) and the two checking observers was as follows:- Attendance at Stations, 0.93; Activities subject engaged in, 0.90; Number of participants, 0.87; Nature of Communication, 0.77; Direction of Communication, 0.73.

RESULTS

Table I shows the changes in cognitive performance over the four month observation period in the nursery school.

Insert Table One

For all subjects taken as a group, the mean improvements were significant and relatively uniform across the measures used. For the two SES groupings the only significant interaction was for the comprehension component of the Reynell test, the lower SES group improving its mean score considerably. Although the difference did not reach significance, the lower SES group also gained more on the performance scale of the WPPSI test and the Reynell Expressive language Scale. Similarly, the higher SES group's performance improved more on the verbal scale of the WPPSI test and on the EPVT. It would seem, therefore, that nursery school is intellectually benefiting most children and in particular, helping the lower SES children in their language comprehension.

The observation data is given in Table II. This provides the mean per cent activity time for the three levels of IQ, the two levels of socio-economic status and for boys and girls. On comparing these significant differences in activity time between the various groups, the factor more strongly associated with the distribution of experiences in nursery school is social economic status. When compared to the lower SES group, the child in the higher SES group spends more time at "cognitive" and less time at "social" activities, less time alone, more time talking both in play and in communication with others - particularly other children. Children in the lower SES group however, spend more time with adults though there is no evidence that when interaction does take place between adults and children the interaction

is unequally distributed between the two SES groups.

Insert Table Two

The relationship between IQ and the distribution of nursery school experiences is not quite so pronounced. There are three characteristics that differentiate between the three IQ groups. High IQ children spend more time listening to stories, more time in verbal interaction with others, and are recipient to more adult initiated communication. In general, the high IQ group spends more time communicating with others, adults in particular. This finding supports the recent work of Cooper (1979) in which she found that adults in nursery school could increase the range and length of utterances in children.

Sex differences are not extensive, but where they do occur there is a clear differentiation between boys and girls. For instance, girls spend less time on physical and more time on social activities. They are more goal orientated and observe what is happening around them more. The data confirms the findings of Cooper (1979) that there is no difference in boys and girls in nursery school in the amount of talking. The present study also indicates that there is no difference on sociability and style of interaction with others.

The striking difference between the sexes and the choice of activity is a very clear indication that even prior to nursery school, there is a very effective sex typing in process in operation (Clark et al. 1969; Brindley et al. 1973).

Insert Table Three

Table III provides the mean per cent activity time for those children whose IQ and language scores either improved ("gainers") or deteriorated ("losers"). Comparing the "losers" and "gainers" then the "losers" spend less time at cognitive activities, more time at physical activities, more time playing outside and are more open ended in their pursuits. In other words, it would appear that those children who get no obvious cognitive benefit from nursery schooling, use the experience as a means of dissipating energy and satisfying emotional needs which have little obvious association with cognitive development.

DISCUSSION

Based on an extensive period of systematic observation, this study provides data on the cognitive socialisation processes occurring in nursery school. Clearly nursery school comprises only one set of situations that contributes to the development of children. The paper does not consider the experiences of children in other situations, such as the home. For a variety of reasons the nursery school experience is of special interest. Not only is it an area of conflicting social policy, but is probably the first intensive experience children encounter that is overtly manipulatable by professional educators. It is crucial therefore to expand our knowledge of the influence of nursery schooling

such that we are aware of the impact of particular value systems on the shaping of future generations.

Clearly in cognitive terms, the majority of children benefit from nursery school. This is perhaps not so surprising as most of the available "choices" for children in free play environment are cognitively orientated. However, this is what children want. They willingly engage in intellectually challenging activities such as problem solving, construction, puzzles and books. Nearly 75 per cent of their time in school is spent in this way. There are ample opportunities for children to swing, climb, ride, slide and bake etc., but these activities are not so frequently chosen, although their availability is perhaps essential.

The most extensive influences on how children spend their time in nursery school are cultural. It would seem that differences in child rearing practices between socio-economic groups and between boys and girls predispose young children to choose activities differently. The intelligence of the child is only weakly associated with overt behaviour. Recent work of Tizard (1979) confirms that these SES differences in language interaction between adults and children are well pronounced in the pre-school years.

As far as SES differences are concerned in the present study, so-called "middle class" children are more sociable, more talkative and more interactive, as well as needing more intellectual challenge in their

activities. There is little doubt that nursery school is quite appropriate for these children - they are using their time to their intellectual advantage. Indeed, so are many of the "working class" children, though they are less sociable, less talkative and less interactive. However, it would appear that there are several children for whom nursery school experience is not immediately beneficial. A crucial question, therefore, is "who are these losers?". As far as the macro factors of IQ, sex and SES are concerned, then the data from this study indicate no consistent trend for losers to be of low or high IQ or to belong to a particular SES group. However there is a very tentative indication of a sex-bias towards girls.

Examination of the composition of both the "loser" and "gainer" groups shows that girls are in the majority in both groups for all the cognitive measures. This finding is extremely provisional and obviously needs further investigation. However, if confirmed, it certainly raises interesting issues about the role of early schooling in social stratification.

In conclusion, although this study is more concerned with hypothesis generation than hypothesis confirmation, it has wider implications for nursery education including the degree and form of structure to be advocated, the physical layout of schools with regard to stations and access indoors or out, the nature of adult involvement and the question

of screening procedures for the early identification of children with learning difficulties. In the case of the latter, observational - type checklists for nursery staff use may be more promising than sophisticated psychometric techniques.

SUMMARY

Using a test - observe - test design with a sample of twenty-nine four year old children, activity choices in a typical progressive nursery school were related to IQ, SES and sex. Whilst the experience intellectually benefited the group as a whole, several children failed to show improvement. These 'losers' spent more time on physical and play activity and more time unoccupied. The low SES group spent more time alone, more time on social/personal activity, more passive time with adults and more time in solitary play. Clear sex differences in activity choice were found.

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The research reported here is based on part of a thesis submitted by the first author to the Department of Education, University of Glasgow in fulfilment of the requirements for the Ph.D. degree.

TABLE 1 MEANS AND SIGNIFICANCE FOR COGNITIVE TESTS

		PRE-TEST			POST-TEST			PRE/POST GAINS AND F.TEST SIGNIFICANCE LEVELS			
		All Subjects	SES (1/2)	SES (4/5)	All Subjects	SES (1/2)	SES (4/5)	All Subjects	Inter-action	SES (1/2)	SES (4/5)
I.Q.	WPPSI (verbal)	109.1	113.0	105.4	114.8	120.9	109.1	5.7 **	N.S.	7.9	3.7
	WPPS I (perf.)	105.5	109.5	101.7	113.3	115.9	110.9	7.8 **	N.S.	6.4	9.2
	WPPSI (full-scale)	108.2	112.6	104.0	115.6	120.4	111.2	7.4 **	N.S.	7.8	7.2
LANGUAGE	Reynell (comprehension)	107.9	11.7	104.5	114.0	115.1	113.0	6.1 **	*	3.4	8.5
	Reynell (expressive language)	101.2	105.2	97.5	104.7	107.4	102.1	3.5 *	N.S.	2.2.	4.6
	EPVT	108.4	11.6	104.5	113.6	120.4	107.2	5.2 **	(*)	7.8	2.7
CREATIVITY	Linear & circ. order	7.6	11.1	4.2	11.9	15.4	8.5	4.3 **	N.S.	4.3	4.3
	Seriation	20.6	24.9	16.0	16.9	30.4	23.7	6.3 **	N.S.	5.6	7.7
	Classification	31.9	35.5	28.5	41.7	41.8	41.7	9.8 **	N.S.	6.3	13.2

Footnote: 1. The IQ and language test scores are standardises scores.

2. Significance levels ** = $P<0.01$
* = $0.01 < P<0.05$
(*) = $0.05 < P<0.1$

TABLE 2 MEAN % ACTIVITY TIME FOR IQ GROUPS, S.E.S. AND SEX

ACTIVITY	LOW IQ (N=7)	MED IQ (N=12)	HIGH IQ (N=10)	SIG. (F.TEST)	SES (1/2) (N=14)	SES (4/5) (N=15)	SIG.	BOYS (N = 11)	GIRLS (N = 18)	SIG.
STATIONS										
Cognitive	72.6	72.1	74.8	NS	76.7	69.8	*	73.7	72.8	NS
Physical	6.8	5.7	8.1	NS	6.5	7.2	NS	11.7	3.8	**
Personal/Social	11.8	15.4	10.0	NS	9.6	15.5	(*)	7.0	16.1	**
Unclassifiable	8.8	6.8	7.1	NS	7.2	7.6	NS	7.7	7.2	NS
SOCIABILITY										
Alone	21.7	15.0	16.4	NS	14.0	20.0	**	12.2	16.4	NS
With 1 child	25.7	21.5	26.6	NS	27.8	21.0	NS	25.2	23.7	NS
With other children	51.4	61.8	54.8	(*)	56.4	57.3	NS	55.0	58.0	NS
With adult(s)	34.1	42.6	40.2	NS	36.1	43.1	(*)	35.7	42.2	NS
LOCATION										
Indoors	94.1	95.2	91.9	NS	94.3	93.4	NS	89.4	96.5	**
PLAY										
Solitary	10.0	6.5	8.2	NS	6.4	9.3	(*)	9.1	7.2	NS
Parallel	32.9	28.8	26.7	NS	31.6	26.7	NS	34.0	26.1	*
Association	5.4	5.1	5.2	NS	5.0	5.4	NS	6.9	4.2	**
Cooperation	8.4	9.7	11.5	NS	9.8	10.2	NS	8.4	11.0	NS
NON PLAY										
Achieving Goal	5.6	3.4	4.5	NS	1.6	3.5	(*)	0.9	3.7	**
Talking	4.0	4.7	5.2	NS	6.1	3.4	**	5.0	4.5	NS
Observing	7.6	7.6	6.7	NS	6.8	7.7	NS	5.4	8.4	**
Listening to stories	8.6	16.9	16.6	*	14.8	14.7	NS	13.0	15.9	NS
Unoccupied	12.5	11.9	12.0	NS	12.4	11.9	NS	12.3	12.0	NS
FORM OF COMMUNICATION										
Verbal	28.7	37.5	39.2	**	40.0	32.3	**	37.4	35.2	NS
Agnostic	0.8	0.8	0.6	NS	0.6	0.9	NS	0.8	0.7	NS
Social	6.3	5.7	5.2	NS	5.1	6.2	*	5.2	5.9	NS
DIRECTION OF COMMUNICATION										
Subject (s)	9.9	10.2	11.2	NS	12.2	8.9	*	11.6	98.	NS
-----→ other child (c)					4.3	4.2	NS	3.9	4.4	NS
S -----→ Adult (A)	3.7	4.4	4.5	NS	5.5	4.4	(*)	4.9	4.9	NS
C ---→S	4.8	4.8	5.0	NS						
A ---→S	11.6	17.5	19.0	*	17.2	16.0	NS	16.0	16.9	NS

+ The IQ bands (WPPSI Full Scale) were:-
Low : - 84 - 99 Med : 100 - 114 High : 115 or over

TABLE 3 SIGNIFICANT DIFFERENCES IN MEAN % ACTIVITY TIME FOR LOSERS AND GAINERS IN COGNITIVE TESTS

1.	I.Q. (WPPSI - full scale)	LOSERS	GAINERS	SIG.
	ACTIVITY	(N=8)	(N=21)	
	Stations - cognitive	69.0	74.7	(*)
	physical	10.5	5.4	*
	Location - indoors	90.1	95.3	*
	Non-play - achieving goal	0.8	3.3	*
2.	REYNELL (Comprehension)			
	ACTIVITY	(N=6)	(N=23)	
	Sociability - with adult	31.8	41.8	*
	Non-play - unoccupied	14.8	11.4	*
	Communication - S → C	13.9	9.6	*
3.	REYNELL (Exp. Language)			
	ACTIVITY	(N=14)	(N=15)	
	Non-play - total	50.9	44.5	*

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